

THE IMMIGRATION OF LEPIDOPTERA TO THE BRITISH ISLES IN 1983

By R. F. BRETHERTON* and J. M. CHALMERS-HUNT**
(Concluded from page 159)

ANNEXE III

The Clouded Yellow (*Colias crocea* Fourc.) in 1983

The abundance of this butterfly attracted much public interest. We have received records of it from about 200 of those whose names appear in Annexe I; many of these have answered appeals for information which were published in "British Birds" and in "Country Life", to whose editors we are grateful for this help. Many others have contributed to the records supplied by some county recorders and by the courtesy of Mr. P. E. Newbery of R.S.P.B. from the wardens of nature reserves. Many of the individual reports are of occasional sightings on field expeditions and in gardens; these are helpful in showing distribution of the species and its abundance in various parts of the country. Counts on a daily basis throughout much of the season have been provided from the bird observatories at Portland, Dorset and Spurn Point, Yorkshire, and other wardens as well as by Mr. A. J. Dewick at Bradwell-on-Sea, Essex and by Mr. G. Gush in South Devon, mostly on the coast. These give a good basis for assessing the timing and size of the various immigrations, and they also contribute heavily to the numbers recorded in the counties concerned. To all these we offer our thanks. Records assembled in the Bulletin of the Amateur Entomologists' Society (vol. 43, no. 342) have also been used.

Over 10,000 individuals in the records received can be dated approximately to eight or seven day periods. The national totals of these are given below. Many more were represented by reports in general terms such as "seen daily" or "very common", which cannot be so treated. They have, however, been estimated and included in the vice county appraisals shown on the accompanying map.

It is probable that in all well over 13,000 individuals are covered by our records. In most of the past thirty years *C. crocea* has been almost a scarce species. 1969, with 550 recorded was the most recent year when it was at all common. In 1959 over 2,000 were reported, in 1949, 7,000, and in the great Clouded Yellow year, 1947, an estimated 30,000. These are the years which colour memories; by contrast, in 1963 there were only seven. There were probably more recorders in 1983 than in earlier years: its abundance surely exceeded that of 1949, but certainly did not approach the general profusion of 1947.

* Folly Hill, Birtley Green, Bramley, Guildford, Surrey, GU5 0LE.

** 1 Hardcourts Close, West Wickham, Kent, BR4 9LG.

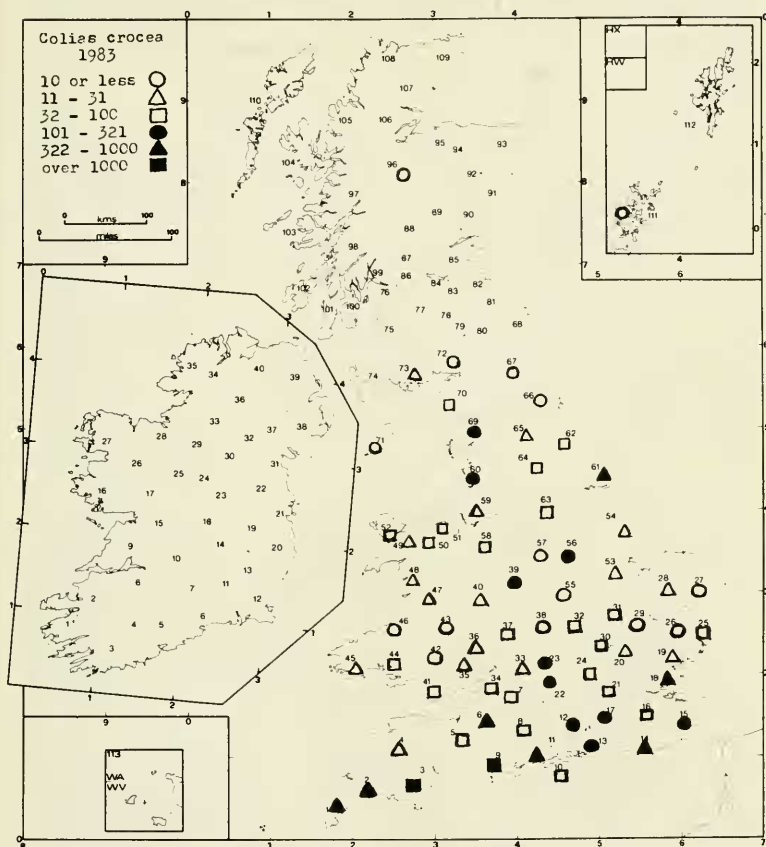


Fig. 1 Map indicating approximate estimated numbers of *Colias croceus* recorded from each vice county.

Weekly and monthly records of *C. croceus* in 1983: dateable records
(Great Britain only)

	I	II	III	IV	Month total
April			1		
June	26	49	65	21	161
July	21	29	86	1647	1783
August	2250	2170	1177	934	6531
September	163	157	321	668	1309
October	228	44	152	94	518
November	26	10	4	1	41
					<u>10343</u>

Note: from July III to September I, these figures relatively understate the actual abundance because of the greater prevalence then of generalised records which are not precisely dated.

The earlier immigrations were clearly defined. After an anomalous single record at Woodwalton Fen, Hunts., on 20 April, the first were seen at Ventnor, Isle of Wight, on 5 June, and on the next and following days about 70 were reported, nowhere in double figures, from South Devon to Kent and near the east coast from Essex to South Yorkshire, and even far inland in at least six counties, as far north as Staffordshire. A slightly larger but similarly scattered influx began about 15 June. Survivors of it accounted for most, if not all, of those reported in the first half of July, but a major influx began on 23 July, reached its height in the next few days, and continued or was repeated in the first week of August. Over 4,000 butterflies can be dated to this period; most of them were primary immigrants, though numbers may have already begun to be swollen by offspring of the early June arrivals. The centres of impact were clearly more westerly than in June: largest in Dorset, Devon and Cornwall, with for the first time records all up the west coast in early August as far as South West Scotland and in western inland counties such as Gloucestershire and Hereford. Thereafter a widespread mixture with probable or possible local emergencies makes it difficult to distinguish the new arrivals with confidence; but sudden peaks of numbers at monitoring stations near the coast suggest a further influx after the middle of August and another, which was probably the last, about 24 September. About then, however, there was some outward migration also. On 23 September over 30 *C. crocea* were seen flying out to sea, accompanied by many *V. atalanta*, from Hayling Island, South Hampshire and there was a similar occurrence next day at Budleigh Salterton, South Devon. Some other recorders of flight directions reported southward movement then and later in the autumn; but it does not seem that this was general.

All these immigrations came in on very wide fronts and continued for several days. In contrast to the massed and very localised arrivals of the great influxes of *C. cardui* in 1980, these *C. crocea* flew spread out in broad continuing streams such as those described throughout the afternoon of 4 August by an observer on a walk along the cliffs from Studland to Swanage, Dorset. He counted 83 individuals flying in from the south or south east, but said that these were a small fraction of the total. Sharp declines in migratory peaks monitored at Portland B. O. and elsewhere indicate that most arrivals on the coast soon moved elsewhere. In Dorset about 150 were seen next day feeding and ovipositing in one of the few remaining fields of lucerne some miles inland at Corfe Castle. At Ernsettle, on the outskirts of Plymouth, where the butterflies

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were flying in from the Tamar estuary, marking experiments by E. Griffiths in the lunch hour on many days in August showed that of 150 which were marked and released only six were recaptured on later days. Several other observers, however, noticed a strong tendency for the butterflies to move sideways, usually westwards, along the south coast, rather than flying directly inland. This, combined with an obvious need for early and prolonged stops for feeding and egg-laying, may explain the relatively small numbers seen far from the coasts. The 24 English and Welsh counties which have no coast-line provided only about 12% of all records. Dates of first sightings in inland counties suggest that June immigrants took several days to reach them after the earlier sightings near the sea. This is less marked in the south after the influx of late July, possibly because of warmer weather; but the butterflies seem to have been slow to work their way up the west coast, where few or none were reported beyond north Wales until well into the first and second weeks of August.

The extent of local breeding of *C. crocea* in 1983 is problematical. There are no accounts of the finding of the cryptic larvae or pupae in the wild, though several observers watched egg-laying in late July and in August, on clover, lucerne, bird's foot trefoil. T. W. Upton has recorded that from eggs laid in captivity in Yorkshire on 14 August the first larva pupated on 20 September and others by 5 October; the date of emergence of adults is not given. Frohawk (1934) gave as an example about 55 days from egg-laying to the emergence of an adult; G. E. L. Manley, however, (1947, *Entomologist* 80:290) said that from an *f. helice* caught on 3 August in Sussex, the laying of 300 eggs began on 7 August, the larvae grew quickly in the warmth of daily 8 hours sunshine, the first pupation taking place on 1 September, the first emergence on 13 September, and all but one of the others by 30 September — a range of 25 to 42 days. If, as is probable, the July warmth of 1983 approached that of August 1947 in south England, offspring of June arrivals could have contributed something to the numbers of adults in late July, and probably much throughout August. In the clear case of local breeding noticed at Lund Gravel Pits in Nottinghamshire, single adults were seen in late June, 20 presumably locally bred on 8 August, 152 in the following week, and 100 more by the end of the month, with three later on 22 September. More generally, in the first three weeks of September, when there is no evidence of fresh immigration, offspring of July immigrants probably accounted for most of the 670 then reported, though their numbers may have been reduced and emergence delayed by lower temperatures and bad weather. Many of the 500 noted in October and the 40 in November may have been either children of the July arrivals or grandchildren of those which came in June. For the year as a whole, however, although successful breeding was certainly numerous in the south

and occurred locally as far north as Yorkshire, it is unlikely to have contributed more than a minority to the total abundance.

Of the pale *C. crocea* f. *helice* about 140 were reported as such, and many others were described as "Pale Clouded Yellows". Of these a few were deliberately claimed as belonging to the true Pale Clouded Yellow (*C. hyale*), or to Berger's Clouded Yellow (*C. australis* Verity). Investigation of several of these for which detailed descriptions or photographs were made available showed that they were in fact referable to *C. crocea* f. *helice*. We have therefore listed in Appendix II as true Pale Clouded Yellows only six examples, all males, five of which were caught or closely examined by experienced recorders between 24 July and 2 August. These were believed to be *C. hyale* rather than *C. australis*, but in the absence of a retained voucher specimen certainty on this is not possible. Others may have been present, but it is clear that in 1983, unlike 1947 and 1949, *C. crocea* was not accompanied by any large influx of the other two species. One specimen, caught at St. John's, East Cornwall on 16 October and sent for examination by T. Aston proved to belong to the uncommon aberration of *C. crocea* f. *helice* in which its usual creamy white colour is modified to pale yellow; another example of this has been recorded from Spinfish, Isle of Wight on 20 October (SAK-J., *Ent. Gaz.* 35:66).

Several observers commented on very large predominances of males. One, who checked his records in both north and south England by captures, had 81 males but only three females, none of which were f. *helice*. In the marking and other counting experiments at Ernsettle, Plymouth already referred to, 111 out of 150 specimens marked were male. It is not clear, however, whether this predominance generally was due to disproportion of immigrants on arrival or to greater and more conspicuous activity by males than by females afterwards. As regards the proportion of females which belonged to f. *helice*, there were nine in the 39 marked, sample (23%): this is considerably higher than the percentages for it in three samples quoted by Ford (1945). Most recorders, however, who reported f. *helice* gave their counts of it against the total of *C. crocea* seen, without distinction of sex. Over the whole season at Ernsettle, Griffiths noted 29 f. *helice* (3.3%) in his total of over 900. The experience of some other observers of large numbers over much of the season varied considerably, giving for f. *helice* at Torpoint, East Cornwall 8%, 5% in both the Thurlstone area and at Aylesbeare Reserve in South Devon, but only 1.6% at Bradwell-on-Sea, Essex, where A. J. Dewick commented that, although the total number, 825, almost equalled that of 1949, the 13 *helice* noted seemed to be below average. But in view of the small numbers of f. *helice* and possible differences in the proportion of males, these percentages do not give much guide to the probable proportions of f. *helice* to those of normal females. F.

helice attracted much attention because its numbers were part of an unwonted general abundance, and because of its resemblance to the true Pale Clouded Yellows.

On the Continent *C. crocea* was seen on the cliffs of north Brittany on 30 July, and was reported to be unusually common in the Cevennes throughout August; but otherwise we have as yet no information about its movements. The June arrivals in England came in from the south or south east, with fairly good numbers of *V. atalanta* and *C. cardui*, and a few of at least ten species of the migratory moths (see Annexe II). They probably all came across France from the Mediterranean area. The much larger invasions by *C. crocea* in late July and early August were more westerly in their arrival points, and were accompanied by the first wave of Vestal moths (*R. sacraria*) as well as by some of the very long distance migrants. Both their direction and their composition suggest that they originated mainly in north Africa, whence migration may have been induced by prolonged and widespread droughts. The last large influx of *C. crocea* in late September came in with what appears to have been a huge invasion of *R. sacraria*. It is noteworthy that this species shared with *C. crocea* the distinction of having its best year in Britain since 1949 or 1947.

We must end with some words of warning. The coverage of this survey is uneven and far from complete, despite the help from so many recorders. In particular, although the general pattern of distribution shown may be broadly correct, we have almost no information about *C. crocea* in West Cornwall (including the Isles of Scilly) before August, although these are usually critical places for the arrival of immigrants. The west coast of Wales and parts of East Anglia, as well as many inland counties, are very thinly covered; and we have not felt able to appraise events in Ireland. Further records and comments which fill these gaps, and especially any which clearly indicate the extent of local breeding, will be very welcome.

THE FEEDING HABITS OF TWO SPECIES OF BURYING BEETLES: *NECROPHORUS VESPILLOIDES* HERBST AND *N. HUMATOR* GOEZE. — During an extensive survey of local woodland for the Shropshire Biological Records Centre, (Ludlow Museum), these two burying beetles were feeding in bait traps originally set up for Diptera.

The bait traps were made from a soft plastic drinks bottle with a 3" x 3" opening at the side, and a removable 3" x 1" glass collecting tube fitted in the neck. The trap was suspended 16' and 2' from the trunk by a greased wire. The bait was well rotted tomato and as many as 10 beetles were found a week from 1 trap. The beetles were often found almost immersed in the putrefying liquid. — D. J. DENMAN, B.Sc., Dip. H.E. BIOL., F.R.E.S.